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Remarks

Favorable reconsideration is requested in view of the above amendments and following comments. Claims 1, 31 and 50 have been amended to include a substrate and a multilayer film, as supported for example in the paragraph bridging pages 19 and 20 of the instant specification. Claim 52 has been amended to specifically recite "carbon". New claim 75 has been added to round out the possible scope of protection as supported for example in the first paragraph of page 23 of the instant specification. No new matter has been added as a result of these amendments. Attached hereto is a marked up version illustrating the amendments made herein.

The Examiner has questioned the relevancy of the art provided by Applicants in this case. Presumably the Examiner is referring to the Information Disclosure Statement that was filed on June 21, 2001, citing four co-pending applications. These cited applications are in the same general field as the instant application and thus were cited to satisfy Rule 56 requirements.

Applicants respectfully traverse the rejection of claim 52 under 35 USC § 112, second paragraph, as indefinite. Claim 52 has been amended, thereby rendering the rejection moot. Applicants do not concede the correctness of the rejection.

Applicants respectfully traverse the rejection of claims 1-29, 31, 50-64 and 74 under 35 USC § 103(a) as unpatentable over Yoshioka et al., U.S. Patent No. 5,194,363 in view of Yoshioka et al., JP 04-052188, and either of Yoshitomi et al., JP 63-171453, Kinou et al., JP 03-248338, JP 01-276453 or Shindo et al., JP 05-274726. The rejection asserts that the cited references, in combination, teach the claimed invention. Applicants disagree.

Claim 1 requires the presence of a substrate and a multilayer film upon the substrate. The multilayer film includes a recording layer, a barrier layer and a protective layer, with the barrier layer positioned between the recording layer and the protective layer. The barrier layer is formed from either GeN or GeNO and is required to include at least one of Al, B, Ba, Bi, C, Ca, Ce, Cr, Dy, Eu, Ga, Hf, In, K, La, Mn, Nb, Ni, Pb, Pd, Si, Sn, Ta, Ti, V, W, Yb, Zn, and Zr.

Similarly, claim 31 requires the use of an optical recording medium having the aforementioned substrate and multilayer film. Claim 50 requires the presence of a substrate and a multilayer film including a recording layer and a layer composed of either GeXN or GeXON, where X is defined as at least one of elements belonging to Groups IIIa, IVa, Va, VIa, VIIa, VIII, Ib and IIb, and carbon.

Yoshioka '363 describes a recording layer that is formed from a ternary alloy of Te, Ge and Sb and at least one nitride of Te, Ge or Sb. A nitrogen adsorption layer can be positioned on at least one side of the recording layer. However, Yoshioka '363 is silent as to forming a barrier layer from a Ge or GeO nitride and at least one element selected from Al, B, Ba, Bi, C, Ca, Ce, Cr, Dy, Eu, Ga, Hf, In, K, La, Mn, Nb, Ni, Pb, Pd, Si, Sn, Ta, Ti, V, W, Yb, Zn, and Zr.

Yoshioka '188 describes an optical recording medium in which a nitride layer is positioned between a recording layer and a dielectric (protective) layer. However, Yoshioka '188 provides no guidance or suggestion concerning a barrier layer that is formed from a Ge or GeO nitride and at least one element selected from Al, B, Ba, Bi, C, Ca, Ce, Cr, Dy, Eu, Ga, Hf, In, K, La, Mn, Nb, Ni, Pb, Pd, Si, Sn, Ta, Ti, V, W, Yb, Zn, and Zr.

The remaining references are relied upon to suggest the inclusion of one or more of these elements in the nitride layers disclosed by Yoshioka '363 and Yoshioka '188. Each of these references describe protective layers that include Ge, N and a third element such as Al, Si or Zr. If one were to consider these protective layers to be barrier layers (a point not conceded by Applicants), the structures suggested by each of the references would lack their substrate.

Moreover, each of these references are directed to magneto-optical recording media, while the claimed invention is directed to phase-change recording media. Phase-change recording media are susceptible to atomic diffusion between the protective and recording layers, particularly at the high temperatures involved in phase-change recording. This is not a significant problem in magneto-optical recording media. Thus, one of ordinary skill would have no motivation to include a barrier layer in a magneto-optical recording media or to consider such a layer to be a barrier layer.

None of these references disclose a barrier layer and thus cannot be considered as describing or suggesting a barrier layer including the claimed additional element. Thus, each of these references fail to remedy the noted shortcomings of Yoshioka '363 and therefore the rejection should be withdrawn.

Applicants respectfully traverse the rejection of claims 1-29, 31, 50-64 and 74 under the judicially created doctrine of obviousness-type double patenting as unpatentable over claims 1-19, 21 and 23 of co-pending Serial No. 09/132,022. A Terminal Disclaimer is submitted herewith, rendering the rejection moot. Applicants do not concede the correctness of the rejection.

In view of the amendments and comments presented herein, favorable reconsideration in the form of a Notice of Allowance is respectfully requested.

Respectfully Submitted,

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: UNO et al. Examiner: M. ANGEBRANNDT
Serial No.: 09/390,228 Group Art Unit: 1756
Filed: SEPTEMBER 3, 1999 Docket No.: 10873.274US11
Title: OPTICAL INFORMATION RECORDING MEDIUM, PRODUCING
METHOD THEREOF AND METHOD OF RECORDING/ERASING/
REPRODUCING INFORMATION

MARKED UP VERSION TO ILLUSTRATE CHANGES MADE

1. (Amended) An optical information recording medium comprising a substrate and a multilayer film, the multilayer film comprising:

a barrier layer;

a first protective layer; and

a recording layer generating a reversible phase-change which can be optically detected according to an irradiation of an energy beam;

wherein said barrier layer is formed between said first protective layer and said recording layer and in contact with said first protective layer and said recording layer, and includes [either] one selected from the group consisting of GeN and GeNO and at least one element selected from the group consisting of Al, B, Ba, Bi, C, Ca, Ce, Cr, Dy, Eu, Ga, Hf, In, K, La, Mn, Nb, Ni, Pb, Pd, Si, Sn, Ta, Ti, V, W, Yb, Zn, and Zr.

31. (Amended) A method of recording/erasing/reproducing am optical information, comprising the steps of:

providing an optical information recording medium comprising a substrate and a multilayer film, the multilayer film comprising a recording layer generating a reversible phase-change which can be optically detected according to an irradiation of an energy beam, a barrier layer, and a protective layer;

recording a signal to said recording layer by irradiating said recording layer with a modulated laser beam erasing a signal recorded on said recording layer by irradiating said recording layer with a laser beam having a predetermined power level;

reproducing a signal recorded on said recording layer by irradiating a laser beam to said recording layer and detecting a light strength of a reflection light or a transmitted light from said recording layer;

wherein said barrier layer is formed between said protective layer and said recording layer and in contact with said protective layer and said recording layer in contact with said protective layer and said recording layer, and includes [either] one of GeN and GeNO and at least one element selected from the group consisting of Al, B, Ba, Bi, C, Ca, Ce, Cr, Dy, Eu, Ga, Hf, In, K, La, Mn Nb, Ni, Pb, Pd, Si, Sn, Ta, Ti V, W, Yb, Zn, and Zr.

50. (Amended) An optical information recording medium comprising a substrate and a multilayer film, the multilayer film comprising a phase-change recording layer having reversibly changeable optical characteristics and a Ge-containing layer comprising [either] one selected from the group consisting of GeXN and GeXON as a main component,

wherein X is at least one element selected from the group consisting of elements belonging to Groups IIIa, IVa, Va, VIa, VIIa, VIII, Ib and IIb, and carbon.

52. (Amended) The optical information recording medium according to claim 50, the medium comprising a first Ge-containing layer and a second Ge-containing layer, the first Ge-containing layer and the second Ge-containing layer comprising [either] one selected from the group of GeXN and GeXON as a main component,

wherein X is at least one element selected from the group consisting of elements belonging to Groups IIIa, IVa, VIa, VIIa, Ib and IIb and carbon [C],

the phase-change recording layer having a first surface on which laser beams are incident in use and a second surface on the other side,

wherein the first Ge-containing layer is in contact with the first surface and the second Ge-containing layer is in contact with the second surface.

New claim 75 has been added herein.